

REMARKS/ARGUMENTS

1. Claims 23-31 Comply with 35 U.S.C. §101

The Examiner rejected claims 23-31 as directed to non-statutory subject matter (35 U.S.C. §101) on the grounds that the “article of manufacture” may encompass transmission media. (OA5, pg. 2).

The Examiner stated that claim 23 recites “an article of manufacture in communication with storage” (OA5, pg. 2) and that the claims recite “a computer readable medium” (OA5, pg. 11). Applicants note that claim 23 does not cite the above mentioned limitations. Applicants submit that the Examiner did not consider or address the amendments Applicants previously made to claim 23, which now specifically recites that the “article of manufacture” comprises “at least one of a computer readable storage medium having code executed by a processor and a hardware device having logic to communicate with a storage and perform operations”.

Applicants submit that a “computer readable storage medium” and “hardware device” do not comprise a transmission medium in which code is implemented. Instead, the claimed “computer readable storage medium” and “hardware device” comprise tangible medium such as disclosed in para. 19 of the Specification.

Applicants request the Examiner to withdraw the Section 101 rejection in view of the current claim language which the Examiner did not address in this rejection.

2. Claims 1, 2, 8, 9, 10-11, 17, 18, 19, 21, 23, 24, 30, and 31 are Patentable Over the Cited Art

The Examiner rejected claims 1, 2, 8, 9, 10-11, 17, 18, 19, 21, 23, 24, 30, and 31 as obvious (35 U.S.C. §103) over Lawrence (U.S. Patent No. 6,253,300) in view of Andrew (U.S. Patent App. No. 2004/0059863) Applicants traverse,

Claims 1, 10, 19, and 23 require: receiving an I/O request to write an update to an object in storage; defragmenting the object in storage so that blocks in storage including the object are contiguous in response to receiving the I/O request to write the update to the object, wherein the request to write the update to the object causes the defragmentation operation; and executing the I/O request to write the update to the object in storage.

The Examiner cited col. 5, lines 37-42 of Lawrence as teaching the claim requirement of defragmenting the object in storage so that blocks in storage including the object are contiguous in response to receiving the I/O request. (OA5, pgs. 3-4)

The cited col. 5 of Lawrence mentions that each file is stored in several locations separated by regions of the storage medium that do not hold the file's contents and that fragmentation can be alleviated or eliminated by running a defragmentation program on the files before copying them.

Nowhere does this cited col. 5 anywhere disclose the claim requirement that an I/O request to write an update to the object causes defragmentation of the object. Instead, the cited col. 5 mentions that a defragmentation program can be run on files before copying them. Although one may run a defragmentation program at any time, after or before copying data, the cited col. 5 still does not disclose defragmenting an object in response to receiving an I/O request to write the update the object to which the defragmentation is directed. Applicants submit that defragmentation files before copying the files does not disclose performing a defragmentation of an object in response to an I/O request to write to the object.

The Examiner cited FIG. 4 of Andrew as triggering a defragmentation in response to an I/O request because a shutdown operation inherently comprises disk write operations. (OA5, pg. 4)

The cited FIG. 4 mentions that a hard drive is defragmented as part of a shutdown operation after temporary Internet files are removed. (Andrews, para. 35). However, the claims require that an object subject to an I/O operation is defragmented in response to an I/O request to update that object. The cited Andrews discusses general defragmenting as part of a shut down operation. However, nowhere does the cited Andrews teach or mention that an object is defragmented in response to an update to that object.

Even if one accepts the Examiner's finding that a shut down operation inherently comprises disk write operations, there is no disclosure of the claim requirement that an object is defragmented updated in response to an update to that object. Further, Andrews mentions that the defragmenting occurs as part of the shutdown. However, the cited Andrews does not teach or mention whether the defragmentation occurs in response to the "inherent" updating of files or before. Thus, there is no disclosure of when the defragmentation occurs with respect to the inherent writing.

Also, there is no disclosure that a specific file is specifically defragmented in response to an update to that file. Instead, the cited Andrews discusses defragmenting to the entire disk as part of a shutdown, not defragment a particular object in response to a write to that object.

Accordingly, claims 1, 10, 19, and 23 are patentable over the cited art because the cited combination of Lawrence and Andrews do not teach or suggest all the claim requirements.

Claims 2, 8, 9, 11, 17, 18, 21, 24, 30, and 31 are patentable over the cited art because they depend from one of claims 1, 10, 19, and 23, which are patentable over the cited art for the reasons discussed above. Moreover, the following of these dependent claims provide additional grounds of patentability over the cited art.

Claims 2, 11, and 24 depend from claims 1, 10, and 23, respectively, and further require that the I/O request is executed with respect to the object after defragmenting the object.

The Examiner cited col. 5, lines 37-39 of Lawrence with respect to these claim requirements. (OA5, pg. 4) Applicants traverse.

The cited col. 5 mentions defragmenting files before copying them. Nowhere does this teach or suggest updating the object after defragmenting the object. Applicants submit that defragmenting an object after updating the object is different and not disclosed by defragmenting a file before copying the file. Applicants note that copying a file does not comprise updating the file.

Accordingly, claims 2, 11, and 24 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited col. 5.

Claims 8, 17, and 30 depend from claims 1, 10, and 23 and further require operations of receiving the I/O request, initiating the operation to defragment the object, and executing the I/O request of defragmenting the object in storage are performed by a storage controller managing I/O requests to the storage.

The Examiner found that that Lawrence discloses this requirement because the defragmentation occurs in a computer and the computer inherently includes a storage controller and device driver. (OA5, pg. 5) Applicants traverse this finding because there is nothing inherent that defragmentation be initiated by the storage controller as opposed to some other computer component. According to the Manual of Patent Examination and Procedure (MPEP), the “fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.” MPEP Sec. 2112, pg. 57

(Aug. 2005, Rev. 3). Thus, the fact that defragmentation “may” be initiated in the storage controller as opposed to a program in the computer makes this finding of inherency inappropriate.

Applicants submit that although computers may have a storage controller as the Examiner notes, the Examiner has not cited any art that discloses, teaches or suggests that performing defragmenting of an object in response to a write to the object is performed by the storage controller. The Examiner is using hindsight to propose a modification to known computer components, such as a storage controller, that is not taught or suggested in the cited art.

Accordingly, claims 8, 17, and 30 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited col. 5.

Claims 9, 18, and 31 depend from claims 1, 10, and 23 and further require that the operation of defragmenting the object in storage is performed by a device driver for the storage providing an interface to the storage.

As with claims 8, 17, and 30, Applicants submit that the claims are patentably distinct because the Examiner has not shown where the cited Lawrence discloses that defragmentation is performed by a device driver for the storage providing an interface to the storage as opposed to some other software program, such as an application program or utility. Thus, it is not inherent that a device driver perform the defragmentation.

Accordingly, claims 9, 18, and 31 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited Lawrence.

3. Claims 3, 12, 20, 25, and 32-34 are Patentable Over the Cited Art

The Examiner rejected claims 3, 12, 20, 25, and 32-34 as obvious (35 U.S.C. §103(a)) over Lawrence in view of Andrew and Brown (U.S. Patent No. 6,038,636). (OA5, pgs. 5-6, 11)

Applicants submit that these claims are patentable over the cited art because they depend from one of claims 1, 10, 19, and 23, respectively, which are patentable over the cited art for the reasons discussed above. Moreover, these claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 3, 12, 20, and 25 depend from claims 1, 10, 19, and 23, respectively, and further require determining whether an amount of fragmentation of the object in the storage exceeds a

fragmentation threshold indicating an acceptable number of bytes stored in non-contiguous locations in response to receiving the I/O request, wherein the object is defragmented if the amount of fragmentation exceeds the fragmentation threshold, and wherein the I/O request to update the object is executed without defragmenting the object in response to determining that the amount of fragmentation does not exceed the fragmentation threshold.

The Examiner cited col. 5, lines 37-39 of Lawrence and col. 10, lines 1-5 and col. 7, lines 45-46 of Brown as teaching the additional requirements of these claims (OA5, pg. 6)

The cited col. 5 mentions that fragmentation can be eliminated or alleviated by running a defragmentation program on the files before copying them. Nowhere does this cited col. 5 anywhere teach determining whether an amount of fragmentation of an object exceeds a threshold indicating an acceptable number of bytes stored in non-contiguous locations in response to receiving a request to write update an object. Instead, the cited col. 5 mentions that one may run the defragmentation program to alleviate or eliminate fragmentation before copying files.

The cited col. 7 of Brown mentions that a file header includes a number indicating that the memory is valid, the name of a file, and a pointer to the next file, a number indicating the size of the file. The cited col. 10 mentions how to determine whether a file is contiguous by determining whether the size field in the header equals a predetermined code. Although the cited Brown mentions a number indicating a size of a file and using the size field in the header to determine whether the file is contiguous, nowhere does this cited of Brown anywhere teach determining whether an amount of fragmentation of an object exceeds a threshold indicating an acceptable number of bytes stored in non-contiguous locations in response to receiving a request to write update an object. Applicants submit a number indicating a size of a file used to determine whether a file is contiguous does not teach or suggest a threshold indicating a number of acceptable bytes of fragmentation.

Accordingly, amended claims 3, 12, 20, and 25 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not taught in the cited combination of Lawrence, Andrew and Brown.

Claims 32, 33, and 34 depend from claims 1, 10, and 23 and further require determining whether an amount of fragmentation of the object in the storage exceeds a fragmentation threshold indicating an acceptable number of bytes stored in non-contiguous locations in

response to receiving the I/O request; determining at least one logical partition including the object, wherein the object is defragmented if the object is within one logical partition; and determining whether the object is read-only, wherein the object is defragmented if the object is not read-only, wherein the I/O request to update the object is executed without defragmenting the object in response to determining at least one of that the object is included in more than one logical partition, that the object is read-only, and that the amount of fragmentation does not exceed the fragmentation threshold.

The Examiner rejected claims 32-34 for the same reasons claims 3, 6, and 7 were rejected. (OA5, pg. 11) With respect to claim 3, 6, and 7 the Examiner cited col. 5, lines 37-39 of Lawrence and col. 10, lines 1-5 and col. 7, lines 45-46 of Brown. (OA5, pg. 6)

The cited col. 5 mentions that fragmentation can be eliminated or alleviated by running a defragmentation program on the files before copying them. Nowhere does this cited col. 5 anywhere teach determining whether an amount of fragmentation of an object exceeds a fragmentation threshold indicating an acceptable number of bytes stored in non-contiguous locations in response to receiving a request to write update an object. Further, there is no teaching of determining whether an object is in a logical partition and read only, such that the object is defragmented if its fragmentation exceeds the threshold, it is in a logical partition and is not read only. Instead, the cited col. 5 mentions that one may run the defragmentation program to alleviate or eliminate fragmentation before copying files.

The cited col. 7 of Brown mentions that a file header includes a number indicating that the memory is valid, the name of a file, and a pointer to the next file, a number indicating the size of the file. The cited col. 10 mentions how to determine whether a file is contiguous by determining whether the size field in the header equals a predetermined code. Although the cited Brown mentions a number indicating a size of a file and using the size field in the header to determine whether the file is contiguous, nowhere does this cited of Brown anywhere teach determining whether an amount of fragmentation of an object exceeds a fragmentation threshold. Further, there is no teaching of determining whether an object is in a logical partition and read only, such that the object is defragmented if its fragmentation exceeds the threshold, it is in a logical partition and is read only. Applicants submit a number indicating a size of a file used to determine whether a file is contiguous does not teach or suggest a threshold indicating a number

of acceptable bytes of fragmentation, such that fragmentation is performed if the fragmentation threshold is exceeded, if the object is in a logical partition and if the object is not read only.

Applicants submit that claims 32-34 provide further grounds of patentability over the cited art because the additional requirements of these claims are not taught or suggested in the cited combination.

4. Claim 22 is Patentable Over the Cited Art

The Examiner rejected claim 22 as obvious (35 U.S.C. §103(a)) over Lawrence, Andrew and further in view of Karger (U.S. Patent No. 5,339,449). (OA5, pgs. 7-8)

Applicants submit that claim 22 is patentable over the cited art because it depends from claim 19, which is patentable over the cited art for the reasons discussed above.

5. Claims 4, 5, 13, 14, 26, and 27 are Patentable Over the Cited Art

The Examiner rejected claims 4, 5, 13, 14, 26, and 27 as obvious over Lawrence in view of Andrew and Douglass (U.S. Patent Pub. No. 2005/018075). (OA5, pg. 8) Applicants traverse.

Applicants submit that these claims are patentable over the cited art because they depend from one of claims 1, 10, and 23, which are patentable over the cited art for the reasons discussed above. Moreover, the below discussed dependent claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 4, 13, and 26 depend from claims 1, 10, and 23, respectively, and further require determining whether a user settable flag indicates to perform defragmentation in response to receiving the I/O request, wherein the object is defragmented if the flag indicates to perform defragmentation.

The Examiner cited para. [0032] of Douglass as teaching the additional requirements of these claims. (OA5, pg. 9)

The cited para. [0032] discusses a power-aware monitor that monitors applications to defer execution of non-critical background tasks, that may be daemons or other application and whose execution is desirable only when there is not a restriction on power usage. Examples include full disk virus scans and defragmentation, among others.

Although the cited para. [0032] discusses a power monitor deferring defragmentation to execute when there is no restriction on power usage, nowhere does the cited para. [0032]

anywhere teach or suggest a user settable flag that indicates to perform defragmentation in response to receiving the I/O request, which is to update the object. Instead, the cited para. [0032] discusses deferring defragmentation for power management concerns, not indicating whether to perform a defragmentation in response to an I/O request as claimed.

Accordingly, claims 4, 13, and 26 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited Lawrence or Douglass.

6. Claims 6, 15, and 28 are Patentable Over the Cited Art

The Examiner rejected claims 6, 15, and 28 as obvious (35 U.S.C. §103) over Lawrence in view of Andrew and Ball (U.S. Patent Pub. No. 2005/0162944). (OA5, pg. 9) Applicants traverse.

Applicants submit that these claims are patentable over the cited art because they depend from one of claims 1, 10, and 23, which are patentable over the cited art for the reasons discussed above. Moreover, these claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 6, 15, and 28 depend from claims 1, 10, and 23 and further require determining at least one logical partition including the object, wherein the object is defragmented if the object is within one logical partition and the I/O request to update the object is executed without defragmenting the object in response to determining that the object is included in more than one logical partition.

The Examiner cited the Abstract, the object 24, and para. 24 of Ball as teaching the additional requirements of these claims. (OA5, pgs. 9-10) Applicants traverse.

The cited Abstract discusses a redundant memory architecture having an active memory and an inactive memory. The active memory supports in-service storage operations. The inactive memory is updated with stored contents of the active memory. Stored contents of the inactive memory are defragmented prior to an activity switch that results thenceforth in the inactive memory assuming the in-service storage operations and the active memory being updated with the stored contents of the inactive memory. The cited para. [0024] of Ball mentions that the defragmentation can be performed on an inactive redundant memory, such that the in-service performance of a counterpart active memory need not be impacted.

Nowhere does the cited Ball anywhere teach or suggest defragmenting the object to update in response to determining that the object is included within one logical partition. Instead, the cited Abstract mentions that the inactive memory is defragmented prior to an activity switch that results in the inactive memory assuming the in-service storage operations and that the defragmentation can be performed on an inactive redundant memory.

Accordingly, amended claims 6, 15, and 28 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not taught or suggested in the cited Lawrence and Ball.

Conclusion

For all the above reasons, Applicant submits that the pending claims 1-6, 8-15, 17-28, and 30-34 are patentable over the art of record. Should any additional fees beyond those paid be required, please charge Deposit Account No. 50-0585.

The attorney of record invites the Examiner to contact him at (310) 553-7977 if the Examiner believes such contact would advance the prosecution of the case.

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